

**EFFECT OF SKIRT ON THE BEARING CAPACITY  
OF CIRCULAR FOOTING ON SAND**

**Final Project**

to complete the requirements of  
achieving S-1 graduate degree of Civil Engineering



prepared by:

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## CERTIFICATION SHEET

### EFFECT OF SKIRT ON THE BEARING CAPACITY OF CIRCULAR FOOTING ON SAND

#### Final Project

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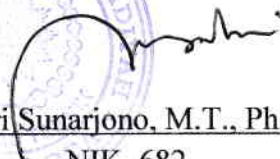
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declare that this Final Project is prepared and presented by myself, except the quotations and summaries that I have explained from all of the sources. If later is found that this Final Project is a plagiarism product, then I will accept any legal consequences that may be imposed to me.

Surakarta, 5<sup>th</sup> of August 2016



Isvan Fajar Satria

## MOTTO

“Say, (O Muhammad, to mankind): ‘If you love Allah, follow me (Muhammad), Allah will love you and forgive your sins.’ Allah is Forgiving, Merciful.”  
(Qur’an Surah Ali ‘Imraan verse 31)

“Verily in Rasulullah has a good example for you, for anyone who hopes Allah's Mercy and the Last Day, and remember Allah much.”  
(Qur’an Surah Al Ahzab verse 21)

“Each of my Ummah will enter Jannah (Paradise), except who don't want to. Whoever obeys me, surely will enter Jannah, and whoever disobeys me, then indeed they have not wanted to.”  
(Rasulullah Muhammad *shalallahu ‘alaihi wassalam*)

“I'm not the best man. If I make a good thing, so please come and help me. If I make a bad thing, then please come and correct me.  
Honesty is a mandate. Lie is a betrayal.”  
(Abu Bakr Ash Shiddiq *radhiallahu ‘anhu*)

“I am the worst leader, if my stomach is full, while my people are starving.”  
(Umar Ibn Khattab *radhiallahu ‘anhu*)

“If our hearts are pure, it would never satiated and bored for reciting the Qur'an.”  
(Utsman Ibn Affan *radhiallahu ‘anhu*)

“Knowledge is better than wealth. Knowledge will take care of you, while you are who take care the wealth. Knowledge is the judge, while the wealth is being judged.  
(Ali Ibn Abi Thalib *radhiallahu ‘anhu*)

## PREFACE

*Assalamu 'alaikum warahmatullahi wabarakatuh*

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## **EFFECT OF SKIRT ON THE BEARING CAPACITY OF CIRCULAR FOOTING ON SAND**

### **Abstract**

Bearing capacity is the most important factor in designing the foundation. It is necessary to find an effort to improve the bearing capacity. Skirts that are attached on the bellow of footing can be used as an alternative of it. They are used to improve the bearing capacity of shallow footing on sand soil. This study is performing twelve laboratory experiments on steel circular footing with different diameters and different skirt length, on the sand soil by keeping the same formation of water content and compaction method. From the accomplished laboratory tests, it was found that skirts are very effective to improve the ultimate bearing capacity, as they increase the length, the ultimate bearing capacity increases up to 4.70 times for the current study condition. Skirts also reduce the settlement. The settlement generally decreases, when it is observed on the same value of load, 2.00 kN. Skirted circular footing with the longest skirt has the best condition of settlement.

**Keywords:** bearing capacity, circular footing, foundation, sand, skirt.

### **Abstrak**

Kapasitas dukung atau *bearing capacity* adalah faktor terpenting dalam merencanakan sebuah fondasi. Diperlukan adanya sebuah upaya untuk meningkatkan nilai kapasitas dukung tersebut. *Skirt* yang dipasang dibagian bawah permukaan fondasi dapat berguna sebagai salah satu solusi tersebut. *Skirt* digunakan untuk meningkatkan kapasitas dukung pada fondasi dangkal tanah pasir. Penelitian ini penyuguhkan duabelas pengujian laboratorium fondasi bentuk lingkaran (*circular footing*) yang terbuat dari baja dengan panjang diameter dan panjang *skirt* yang berbeda-beda, pada media tanah pasir dengan mempertahankan kesamaan kadar air dan metode pemadatannya. Dari keseluruhan pengujian laboratorium, diketahui bahwa *skirt* sangat efektif untuk meningkatkan nilai kapasitas dukung ultimit (*ultimate bearing capacity*), dengan adanya *skirt*, besarnya nilai kapasitas dukung ultimit bisa mencapai 4,70 kali dari nilai kapasitas dukung ultimit apabila tanpa *skirt*. *Skirt* juga dapat mengurangi penurunan (*settlement*). Secara umum penurunan semakin berkurang, saat ditinjau pada satu nilai beban yang sama, yaitu 2,00 kN. *Circular footing* dengan *skirt* paling panjang menunjukkan kondisi penurunan terbaik.

**Kata Kunci:** kapasitas dukung, penurunan, fondasi, circular footing, skirt, pasir.